

REMARKS/ARGUMENTS

Reconsideration and withdrawal of the rejections and objections of this application are respectfully requested in view of the amendments and remarks herein, which place the application into condition for allowance. The present amendment is being made to facilitate prosecution of the application.

I. STATUS OF THE CLAIMS AND FORMAL MATTERS

Claims 1-18 are currently pending. Claims 1, 4, 7, 10, 13, and 16 are independent. No claims were amended.

No new matter has been introduced into the Application by this Amendment. Support for this amendment is provided throughout the Specification as originally filed.

Changes to claims are not made for the purpose of patentability within the meaning of 35 U.S.C. §101, §102, §103, or §112. Rather, these changes are made simply for clarification and to round out the scope of protection to which Applicants are entitled.

II. OBJECTIONS TO THE SPECIFICATION

(a) The third paragraph on page 6 was objected to because the term “data level” was allegedly unclear. In the interest of advancing prosecution, Applicants have amended the disclosure, thereby obviating the objection.

(b) The Specification was objected to because the Hamming window described in Equation 4 on page 12 of the Specification was allegedly different from the well-known Hamming function definition. Applicants respectfully submit that a simple trigonometric transformation will transform Equation 4 into the well-known Hamming function definition.

However, in the interest of advancing prosecution, Applicants have amended Equation 4 to the standard Hamming function definition.

(c) Paragraph 2 on page 13 has been amended, thereby obviating the objection.

(d) The Specification was objected to because pages 14-15 allegedly failed to disclose how to compare the correlation coefficient of a “small” window with that of a “large” window based on equation (5). Applicants respectfully submit that the value of the self-correlation coefficient D40 from the self-correlation calculation unit 40 and the value of the self-correlation coefficient D41 from the self-correlation calculation unit 41 are compared at the judgment operation unit 42. By comparing these two values D40 and D41, it is possible to get the similarity of the audio waveforms. (See line 14 on page 12 to line 13 on page 20.)

Applicants respectfully submit that it is possible to compare the two values because each of the values of the self-correlation coefficients D40 and D41 has been respectively normalized by the number of samples of each correlation window.

(e) Pages 15, 16, and 17 (paragraphs 1, 2, and 3, respectively) have been amended, thereby obviating the objections. Additionally, Applicants respectfully submit that the threshold of the difference which is significant is a matter of design choice.

(f) The Specification was objected to for allegedly not showing that the sound quality is improved. Applicants respectfully traverse the objection. The prediction coefficients read out from the prediction memory 15 are used for the prediction operation by the prediction operation unit 16 in step 105 (see Figure 3 in the Drawings). Thus, the input audio data is converted to a desired output audio data by the prediction operating suitable for the features of the input audio data. Thereby, the input audio data is converted to an output audio data with

improved sound quality (see page 12 of the Specification). The Specification clearly teaches how the sound quality is improved on page 29:

“The audio signal processing device 10 obtains prediction coefficients to obtain audio data without deviation and with high sound quality (teacher audio data), for each class in advance in learning, and **conducts the prediction calculation on input audio data D10 class-classified based on the judgment result of the self correlation coefficients, by the prediction coefficients corresponding to that class. Thus, the input audio data D10 is prediction-operated using the prediction coefficients corresponding that sound quality**, so that the sound quality is improved to the degree sufficient for practical use.” (Emphasis added)

In other words, the audio data is improved by increasing its sampling rate (in other words, creating new sampling data and interpolating it) with this invention. Applicants respectfully direct the Examiner to lines 10-14 on page 4 and lines 2-10 of page 21 in the Specification for further explanation. Therefore, Applicants respectfully request that the objection to the Specification be withdrawn for the reasons cited above.

(g) Equation 10 on page 26 has been amended, thereby obviating the objection.

(h) The second paragraph on page 28 has been amended, thereby obviating the objection based on the antecedent basis problem. The relationship between device 30 and device 10 is explained on page 20 (third paragraph), where the Specification teaches:

“Next, a learning circuit for obtaining a set of prediction coefficients for each class to be memorized in the prediction coefficient memory 15 [of device 10], which is described in Fig. 1, by learning [in device 30] in advance will be explained.”
(Emphasis and comments added.)

Applicants respectfully submit that the relationship between device 30 and device 10 is clear from the Specification, as explained in the transition paragraph above. The learning circuit of device 30 is used to generate the prediction coefficients, which are stored in the prediction coefficient memory 15 of device 10.

In light of the present Amendment and for all the reasons stated above, Applicants respectfully request that the objections to the Specification be withdrawn.

III. OBJECTIONS TO THE CLAIMS

Claims 1-18 were objected to in the Office Action because allegedly the claim limitation of “digital signal” is broader in scope than the processing of “digital audio signals” described in the Specification. Applicants respectfully traverse the objection.

Firstly, the Specification teaches throughout that the instant invention may be used on any kind of signal, such as an audio signal or an image signal. The Specification states on page 1 that the present invention relates to “... **data interpolation processing performed on digital signals** by a rate converter or a PCM (Pulse Code Modulation) demodulation device” (emphasis added). The Specification also states that the description of the present invention is with reference to a single embodiment (i.e., audio signal, see paragraph 3 on page 4). The Specification states on page 33 (third paragraph):

“Furthermore, the embodiment described above has dealt with the case of using the primary linear method as the prediction system. **The present invention, however, is not only limited to this but also, in short, the result of learning may be used, such as the method by multi-dimensional function. In the case where digital data supplied from the input terminal T_{IN} is image data, various prediction systems, such as the method to predict from the pixel value itself can be applied.** (Emphasis added)

Therefore, Applicants respectfully submit that the Specification *clearly teaches how the present invention may be applied to digital image signals* (see page 33 of the Specification)[†].

[†] Limitations from the Specification are not to be read into the claims. See *Superguide Corp. v. DirecTV Enterprises, Inc.*, 358 F.3d 870, 875, 69 USPQ2d 1865, 1868 (Fed. Cir. 2004) (“Though understanding the claim language may be aided by explanations contained in the written description, it is important not to import into a claim

Therefore, since the Specification clearly teaches that the invention covers different types of digital signals (including audio and image signals), and is not limited to just audio signals, and since it is improper to read limitations from the Specification into the claims, Applicants respectfully submit that the objection to the claims is improper and should be withdrawn.

IV. REJECTIONS UNDER 35 U.S.C. §112

Claims 3, 6, 9, 12, 15, and 18 were rejected under 35 U.S.C. §112, second paragraph, for allegedly lacking sufficient antecedent basis. The present Amendment obviates the rejection.

Claims 1-18 were rejected under 35 U.S.C. §112, first paragraph, for allegedly failing to comply with the enablement requirement. Applicants respectfully traverse the rejection.

MPEP §2164.01 ("Test of enablement") states:

The fact that experimentation may be complex does not necessarily make it undue, if the art typically engages in such experimentation. *In re Certain Limited-Charge Cell Culture Microcarriers*, 221 USPQ 1165, 1174 (Int'l Trade Comm'n 1983), *aff'd. sub nom., Massachusetts Institute of Technology v. A.B. Fortia*, 774 F.2d 1104, 227 USPQ 428 (Fed. Cir. 1985). See also *In re Wands*, 858 F.2d at 737, 8 USPQ2d at 1404. The test of enablement is not whether any experimentation is necessary, but whether, if experimentation is necessary, it is undue. *In re Angstadt*, 537 F.2d 498, 504, 190 USPQ 214, 219 (CCPA 1976). (See MPEP §2164, Emphasis added)

limitations that are not part of the claim. **For example, a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment.**") [MPEP §2111.01, emphasis added]

The Office Action correctly states on page 6 (lines 9-11) that the Specification discloses how to classify the part into a class (see Equation 2 in the Specification), how to calculate the self-correlation coefficients (see Equation 5 in the Specification), and describes the claimed invention (see pages 10-11 of the Specification). Therefore, Applicants respectfully submit that, as explained in MPEP §2164 (quoted above), no undue experimentation is required to practice the claimed invention.

Accordingly, Applicants respectfully request that the rejection of claims 1-18 under 35 U.S.C. §112 (first paragraph) be withdrawn.

Claims 3, 6, 9, 12, 15, and 18 were rejected under 35 U.S.C. §112, first paragraph, because the Specification allegedly does not enable the recitation “the self correlation coefficients are calculated after eliminating the amplitude element of the digital signal.” Applicants respectfully submit that the cross-correlation and self-correlation (or autocorrelation) functions are often normalized so that they are equal to one at the origin (at $\tau = 0$). The self-correlation function is given by (see also Equation 5 of the Specification):

$$G(k) = \frac{1}{N-k} \sum_{i=1}^{N-k} f(i) \cdot f(i+k)$$

The self-correlation function may be normalized as follows:

$$G_n(k) = \frac{G(k) - [f]^2}{G(0) - [f]^2}$$

Therefore, Applicants respectfully submit that the recitation of “eliminating the amplitude element of the digital signal” is sufficiently clear, and hence sufficiently enabled, to allow a person of ordinary skill in the art to recognize the use of the normalized autocorrelation

function (i.e., as defined above) in place of the auto-correlation function defined in Equation 5 on page 13 of the Specification.

Therefore, Applicants respectfully request that the rejections of claims 3, 6, 9, 12, 15, and 18 under 35 U.S.C. §112 (first paragraph) be withdrawn.

V. REJECTIONS UNDER 35 U.S.C. §103(a)

Claims 1-2, 4-5, 7-8, 10-11, 13-14, and 16-17 were rejected under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent No. 6,360,198 to Imai et al. (hereinafter, merely “Imai”) in view of U.S. Published Patent Application No. 2002/0138256 to Thyssen (hereinafter, merely “Thyssen”).

Claim 1 recites, *inter alia*:

“... a step of cutting parts out of the digital signal by plural windows having different sizes and calculating their respective self correlation coefficients;

a step of classifying the parts into a class based on the calculation results of the self correlation coefficients; and

a step of generating a new digital signal which is obtained by the digital signal, **by prediction-operating the digital signal by a prediction method corresponding to the obtained class.**”
(Emphasis added)

As understood by Applicants, Imai relates to an audio processing method capable of outputting voice having regular pitch regardless of reproduction speed. An audio processing method of, when reproducing, at a reproduction speed different from that at which an audio signal have been recorded in a recording medium, the audio signal on the recording medium, adjusting the pitch of the reproduced audio signal.

As understood by Applicants, Thyssen relates to a multi-rate speech codec that supports a plurality of encoding bit rate modes by adaptively selecting encoding bit rate modes to match communication channel restrictions. The encoder generates pluralities of code-vectors from a single, normalized code-vector by shifting or other rearrangement. As a result, searching speeds are enhanced, and the physical size of a codebook built from such code-vectors is greatly reduced.

Applicants respectfully submit that nothing has been found in Imai or Thyssen, taken alone or in combination, which would teach or suggest the above-identified features of claim 1. Specifically, neither Imai nor Thyssen, taken alone or in combination, disclose or suggest, “a step of generating a new digital signal which is obtained by the digital signal, by prediction-operating the digital signal by a prediction method corresponding to the obtained class,” as recited in claim 1. Nothing has been found in Imai or Thyssen to suggest that the prediction method is selected to correspond to the obtained class, as recited in claim 1.

Additionally, Applicants respectfully submit that there is no motivation, suggested or implied, within either Imai or Thyssen, to combine the reference teachings to make the claimed invention. MPEP §2145(X)(c) states:

As discussed in MPEP §2143.01, **there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify or combine reference teachings.** The Federal Circuit has produced a number of decisions overturning obviousness rejections due to a lack of suggestion in the prior art of the desirability of combining references, as discussed in the aforementioned section. (Emphasis added)

Applicants respectfully submit that there is no motivation or suggestion in Imai or Thyssen to prediction-operate the digital signal by a prediction method corresponding to the obtained class, as recited in claim 1. The Office Action (on page 9, lines 5-6) relies on paragraph

4 of Thyssen for a motivation to combine the reference teachings: "... for the purpose (motivation) of modeling a signal value according to an earlier value." However, this merely provides a purpose for using *Thyssen's* invention, but provides no reason or motivation to combine Thyssen's teachings with Imai. In fact, it provides *no* motivation *whatsoever* to create the claimed combination, since there is no motivation or suggestion to prediction-operate the digital signal by a prediction method corresponding to the obtained class, as recited in claim 1.

Applicants respectfully submit that *impermissible hindsight* reconstruction of the claimed invention using elements of the prior art is *not* allowed under 35 U.S.C. §103 (see MPEP §2142 for a discussion of impermissible hindsight).

Furthermore, MPEP §2143.01(III) states:

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990) (Emphasis in original.)

Applicants respectfully submit that the Office Action has merely created a mosaic of features from the prior art, without either a clear motivation or a suggestion of the desirability of the combination.

Additionally, MPEP §2143.01(IV) states:

A statement that modifications of the prior art to meet the claimed invention would have been "well within the ordinary skill of the art at the time the claimed invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). (Emphasis added)

As noted above, the Office Action has merely provided references to teach individual aspects of the claimed invention in total isolation, and has not established a *prima*

facie case of obvious. The Office Action has failed to provide an objective reason to *combine* the disparate and unrelated teachings of the references into the claimed combination. In fact, the prior art of record *totally lacks* any suggestion or motivation to prediction-operate the digital signal by a prediction method corresponding to the obtained class, as recited in claim 1.

For all the reasons stated above, Applicants respectfully submit that claim 1 is patentable.

For reasons similar to, or somewhat similar to, those described above with regard to independent claim 1, independent claims 4, 7, 10, 13, and 16 are also patentable.

VI. DEPENDENT CLAIMS

The other claims are each dependent from one of the independent claims, discussed above, and are therefore patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

CONCLUSION

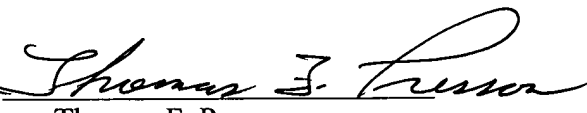
In the event the Examiner disagrees with any of statements appearing above with respect to the disclosure in the cited references, it is respectfully requested that the Examiner specifically indicate those portions of the reference, or references, providing the basis for a contrary view.

Please charge any additional fees that may be needed, and credit any overpayment, to our Deposit Account No. 50-0320.

In view of the foregoing amendments and remarks, it is believed that all of the claims in this application are in condition for allowance and Applicants respectfully request early passage to issue of the present application.

Respectfully submitted,

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